

## 1. VALIDITY OF APPROACH

THE RESEARCH PROPOSAL'S OBJECTIVE TO DEVELOP A FLASH BLINDNESS SIMULATION TECHNIQUE TO PREDICT THE PROBABILITIES OF TASK PERFORMANCE DECREMENT UNDER VARIOUS CONDITIONS OF FLASH EXPOSURE

APPEARS REASONABLY VALID AND FEASIBLE. IN THE SIMULATION, WHICH WOULD BE BASED ON THE DATA FROM THE FLASH BLINDNESS FLASHES AT LOW ILLUMINATION LEVELS, THE PREDICTIVE APPROACH. THE SIMULATION WOULD BE BASED ON LOW LEVELS, ASSUMING THAT THE PERFORMANCE TASKS ARE CLOSELY RELATED TO ACTUAL SITUATIONS. WE ARE CONCERNED THAT SINCE ACTUAL ORAL TASKS ARE CRITICAL, HAVE NOT BEEN ESTABLISHED, AND THEREFORE THE INTERPRETATION OF ACTUAL FLASHES MUST BE MADE, THAT THE PREDICTIVE USEFULNESS OF THE SIMULATION DATA WILL BE LIMITED TO GENERAL, LOW LEVEL OF EXPOSURE. IF POTENTIAL APPLICATIONS CAN IGNORE THE POSSIBILITY OF HARMFUL EFFECTS, THEN THE SIMULATION PREDICTIONS WOULD BE RELIABLE & VALUABLE WITH REFERENCE TO INDIVIDUALS EXPOSED AT LOW STIMULUS FROM THE SOURCE AND CONSEQUENTLY RECEIVING EXPOSURE INTENSITIES SIMILAR TO THOSE TESTED IN THE STUDY. HOWEVER, IT SHOULD BE CLEARLY UNDERSTOOD, THAT THE SIMULATION PREDICTIONS MIGHT NOT BE APPROPRIATE FOR HIGH INTENSITY EXPOSURES, REGARDLESS OF WHETHER PERMANENT OR TEMPORARY EFFECTS.

## 2. TASK RELEVANCE

THE PROPOSAL DOES NOT PRESENT THE PERFORMANCE TASK IN SUFFICIENT DETAIL TO ALLOW EVALUATIONS OF ADEQUACY AND RELEVANCE. OUR EXPERIENCE INDICATES THAT PERFORMANCE TASK DESIGN, MEASUREMENT AND EXTRAPOLATIVE POWER IN THE PROPOSED STUDY MAY BE VERY DIFFICULT TO ACHIEVE, WHILE THE SIMULATION TECHNIQUE ITSELF MAY BE RELATIVELY EASY TO ACHIEVE. THE TASKS, MEASUREMENT METHODS AND FIELD APPLICABILITY SHOULD BE ELABORATED FURTHER SINCE PERFORMANCE ESTIMATES ARE THE PRIMARY OUTPUT OF THE PROPOSED WORK.

## 3. CONCLUSIONS

IF HUMAN PERFORMANCE DATA ARE NEEDED UNDER CONDITIONS OF VARIOUS INTENSITY CORRESPONDING TO FLASHBLINDNESS RECOVERY FOLLOWING LOW TO MODERATE INTENSITY EXPOSURE, THEN THE PROPOSED SIMULATION

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THE DESIRED OUTPUT DESIRED.

QUESTIONS EXIST AS TO THE ACCURACY OF THE MODEL UPON WHICH THE PREDICTIONS OF THE SIMULATION TECHNIQUE ARE BASED WHEN EMPLOYING FLASH INTENSITIES WHICH ARE POTENTIALLY DAMAGING. THESE QUESTIONS MIGHT BE BEST APPROACHED IN SUPPLEMENTARY EXPERIMENTS USING ANIMALS.

#### GENERAL REMARKS:

WITH RESPECT TO THE OVERALL QUESTION OF THE EFFICACY OF FLASH BLINDNESS INCAPACITATION, OUR PRELIMINARY THINKING IS THAT THE TECHNIQUE WOULD BE MOST VALUABLE AS AN ADJUNCT TO OTHER TACTICS. THERE MAY BE A NUMBER OF SITUATIONS IN WHICH A FEW SECONDS OF DISORIENTATION, CONFUSION AND IMPAIRED VISION WOULD ALLOW FRIENDLY PERSONNEL TO ACCOMPLISH SOME VITAL OBJECTIVE OR PERMIT THE CAPTURE OR RESTRAINT OF UNFRIENDLY INDIVIDUALS. THE FLASH TECHNIQUE WOULD BE MOST USEFUL AT NIGHT; IT WOULD NOT BE AN INCONSPICUOUS TACTIC.

IN CONSIDERING THE OPERATIONAL EMPLOYMENT OF ANY FLASH BLINDNESS SYSTEM, IT WOULD SEEM IMPERATIVE TO KNOW THE CONSTRAINTS ON THE USE OF THE SYSTEM. THESE CONSTRAINTS WOULD BE DICTATED WHEN, HOW, AND UNDER WHAT CONDITIONS THE SYSTEM MIGHT BE USED. THEY WOULD AFFECT THE CHOICE OF DELIVERY SYSTEM. IF A GRENADE OR OTHER PROJECTILE-TYPE DELIVERY SYSTEM WERE USED, A SMALL ERROR IN PLACEMENT OF THE PYROTECHNIC DEVICE COULD MEAN A HUNDREDFOLD (OR MORE) DIFFERENCE IN LIGHT INTENSITY AT THE TARGET POINT. THIS IS A STRAIGHTFORWARD EFFECT OF THE INVERSE SQUARE LAW.

SPECIFICALLY, IT SEEMS AS THOUGH THE RETINAL AGE THRESHOLD FOR LIGHT FLASHES MUST BE DETERMINED BEFORE FLASHES COULD BE USED OPERATORALLY. IT WOULD SEEM, TOO, THAT GROSS OR EVEN MICROSCOPIC RETINAL DAMAGE CRITERIA ARE NOT ACCEPTABLE WHERE HUMAN EXPOSURE IS CONTEMPLATED -- ESPECIALLY IF NON-BELLIGERENT INDIVIDUALS ARE INVOLVED. IF SAFE EXPOSURE CRITERIA ARE NOT EVEN AVAILABLE FOR EXPERIMENTAL TESTING OF THE FLASHES, IT WOULD APPEAR THAT WE DON'T KNOW ENOUGH TO USE THESE DEVICES OPERATORALLY -- EVEN IF WE CAN PREDICT THE PERFORMANCE DECREMENT EXPECTED.

#### 5. ALTERNATE SUPPLEMENTARY APPROACHES:

SOPHISTICATED PRIMATE STUDIES COULD PROVIDE INFORMATION AS TO THE FUNCTIONAL DAMAGE THRESHOLD. FOR EXAMPLE, IS SUCCESSFULLY USING TARGET RINGS OF VARYING GAP WIDTH TO MEASURE VISUAL ACUITY IN MONKEYS; THERE ARE OTHER TECHNIQUES. EVOKED POTENTIALS ARE A GOOD MEANS OF MEASURING VISUAL THRESHOLD -- A TECHNIQUE ALREADY USED FOR AT OUN.

IN ADDITION TO MEASURING DAMAGE THRESHOLD, EXPERIMENTS WITH TRAINED PRIMATES COULD PROVIDE A MEASURE OF PERFORMANCE DECREMENT FOLLOWING EXPOSURE TO THE ACTUAL FLASHES THEMSELVES. MUTUAL PERFORMANCE UNDER SIMILAR CONDITIONS MIGHT BE CORRELATED FROM THESE RESULTS. WHILE PERFORMANCE DECREMENT OF 50% AND UNDER CONDITIONS OF SIMULATED FLASH BLINDNESS MAY BE IMPORTANT TO KNOW, THERE APPEARS TO BE SOME OTHER INFORMATION CORRELATED TO THE ACCEPTABLE INTENSITY LEVEL OF REAL FLASHES FOR USE UNDER REAL FIELD CONDITIONS. THIS LATTER DATA MIGHT BE BETTER DETERMINED FROM CAREFULLY CONDUCTED FIELD STUDIES.